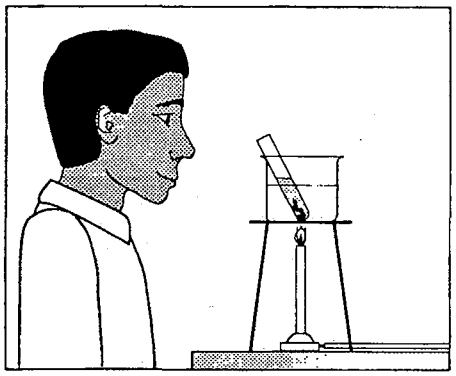
Name_____

Lab safety & skill review
Living Environment

1. When heating a solution in a test tube, a student should
   1) point the test tube in any direction
   2) hold the test tube with two fingers
   3) cork the test tube
   4) wear goggles

2. An *unsafe* procedure for heating a nutrient solution in a flask would be to
   1) heat the solution at the lowest temperature possible on a hot plate
   2) stopper the flask tightly to prevent evaporation of the solution
   3) use a Bunsen burner to heat the solution
   4) stir the solution while it is heating

3. Base your answer on the diagram below and on your knowledge of biology.



   Which statement describes *two* unsafe laboratory practices represented in the diagram?
   1) The flame is too high and the test tube is unstoppered.
   2) The opening of the test tube is pointed toward the student and the student is not wearing goggles.
   3) The test tube is unstoppered and the student is not wearing goggles.
   4) The beaker has water in it and the flame is under the tripod.

4. The development of an experimental research plan should *not* include a
   1) list of safety precautions for the experiment
   2) list of equipment needed for conducting the experiment
   3) procedure for the use of technologies needed for the experiment
   4) conclusion based on data expected to be collected in the experiment

5. A transparent metric ruler is placed on the stage of a microscope and observed under low power. The diameter of the field of vision was found to be 2 millimeters. How many micrometers is the diameter?
   1) 10
   2) 200
   3) 1,000
   4) 2,000

6. Which group of measurement units is correctly arranged in order of increasing size?
   1) kilometer, centimeter, millimeter, meter
   2) millimeter, kilometer, centimeter, meter
   3) meter, kilometer, centimeter, millimeter
   4) millimeter, centimeter, meter, kilometer

7. A mineral supplement designed to prevent the flu was given to two groups of people during a scientific study. Dosages of the supplement were measured in milligrams per day, as shown in the table below.

Supplement Dosages

Group	Dosage (mg/day)
A	100
B	200

   After 10 weeks, neither group reported a case of the flu. Which procedure would have made the outcome of this study more valid?
   1) test only one group with 200mg of the supplement
   2) test the supplement on both groups for 5 weeks instead of 10 weeks
   3) test a third group that receives 150mg of the supplement
   4) test a third group that does not receive the supplement

8. When a test tube of water containing elodea (an aquatic plant) is placed near a bright light, the plant gives off gas bubbles. When the light is placed at different distances from the plant, the rate of bubbling is affected. The independent variable in this demonstration is the
   1) concentration of gas in the water
   2) type of aquatic plant in the test tube
   3) amount of water in the test tube
   4) distance of the plant from the light

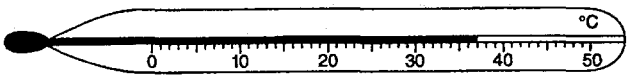
9. Which sentence represents a hypothesis?
   1) Environmental conditions affect germination because of chemical changes that occur.
   2) Boil 100 milliliters of water, let it cool, and then add 10 seeds to the water.
   3) Is water depth in a lake related to available light in the water?
   4) A lamp, two beakers, and elodea plants are selected for the investigation.

10. In an investigation designed to determine the effect of the amount of water on plant growth, two groups of equal-sized bean plants of the same species were grown under identical conditions, except for the amount of water they were given. One group was watered with 200 milliliters of water once a day, while the other group was watered with 400 milliliters of water once a day. After several days, the heights of the plants were measured. It was determined that the plants watered with 400 milliliters of water once a day showed more growth.

The independent variable in this investigation is the

1) type of bean plants used in the experiment
2) amount of water given the plants each day
3) type of soil the bean plants were growing in
4) group of bean plants watered with 200 ml of water

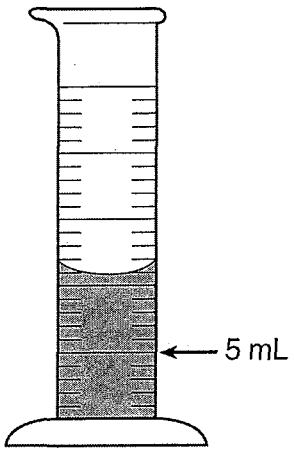
11. The diagram below represents a thermometer that is inside an incubator.



A student needs to incubate a bacterial culture at 43°C. According to the reading on the thermometer, how many degrees must the temperature in the incubator be increased to reach this temperature?

1) 9
2) 6
3) 3
4) 12

12. How much water should be removed from the graduated cylinder shown below to leave 5 milliliters of water in the cylinder?

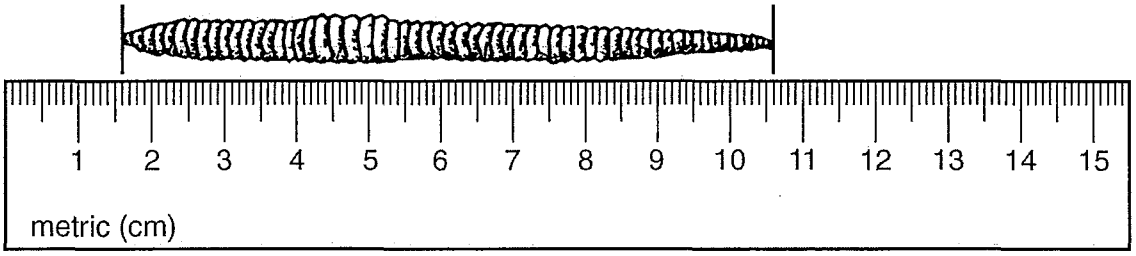


1) 6 mL
2) 7 mL
3) 11 mL
4) 12 mL

13. A company that manufactures a popular multivitamin wanted to determine whether their multivitamin had any side effects. For its initial study, the company chose 2000 individuals to take one of their multivitamin tablets per day for one year. Scientists from the company surveyed the participants to determine whether they had experienced any side effects. The greatest problem with this procedure is that

1) only one brand of vitamin was tested
2) the study lasted only one year
3) the sample size was not large enough
4) no control group was used

14. What is the approximate length of the earthworm shown in the diagram below?



1) 9 mm
2) 90 mm
3) 10.6 cm
4) 106 cm

Part B–2

Answer all questions in this part. [12]

Directions (): For those questions that are multiple choice, record on the separate answer sheet the *number* of the choice that, of those given, best completes each statement or answers each question. For all other questions in this part, follow the directions given and record your answers in the spaces provided in this examination booklet.

Base your answers to questions 15 through 19 on the information and data table below and on your knowledge of biology.

Daphnia (water fleas) are sensitive to many changes in pond ecosystems. For this reason they are often used in bioassays, tests in which organisms are exposed to various levels of a chemical to determine what levels are safe. The results of these tests determine whether or not the chemical being tested will affect other pond organisms.

An experiment was designed to determine the toxicity of different salt solutions on cultures of daphnia. Five fish tanks were each filled with the same amount of water containing different concentrations of salt. Ten daphnia were placed into each tank. After 48 hours, the number of daphnia that had survived and the number of daphnia that had died in each tank were recorded and the percent mortality was calculated. The results of the experiment are shown in the data table below.

Effect of Salt Concentration on Daphnia After 48 Hours

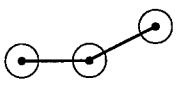
Salt Concentration (g/L)	Number that Survived	Number that Died	Mortality (%)
0.63	8	2	20
1.25	7	3	30
2.5	10	0	0
5.0	3	7	70
10.0	0	10	100

Directions ( ): Using the information in the data table, construct a line graph on the grid *on the next page*, following the directions below.

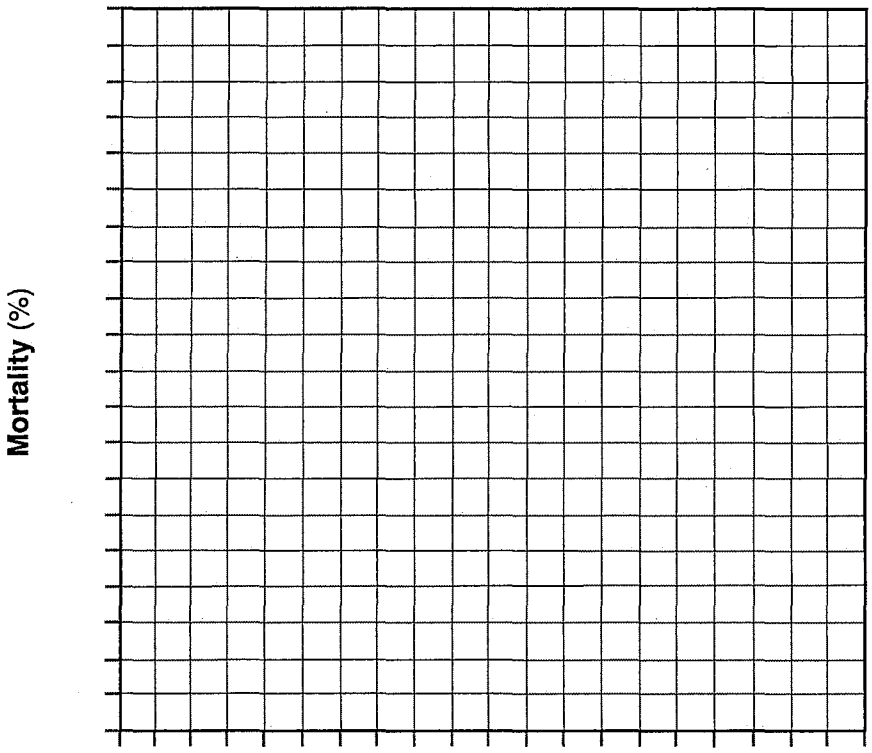
15) Label the *x*-axis. Be sure to include units. [1]

16) Mark an appropriate scale, without any breaks, on each axis. [1]

17) Plot the data for mortality on the grid. Surround each point with a small circle and connect the points. [1]

Example: 

Effect of Salt Concentration on Daphnia
After 48 Hours



Note: The answer to question 47 should be recorded on your separate answer sheet.

18) Which salt concentration was most toxic to the daphnia in this experiment?

(1) 1.25 g/L
(2) 2.5 g/L
(3) 5.0 g/L
(4) 10.0 g/L

19) Which salt concentration is most likely closest to the concentration of salt found in the natural environment of this species of daphnia? Support your answer. [1]

Salt concentration:_____ **g/L**

Part C

Answer all questions in this part. [17]

Directions (): Record your answers in the spaces provided in this examination booklet.

Base your answer to question 20 on the information below and on your knowledge of biology.

For Teacher Use Only

Help for Aging Memories

As aging occurs, the ability to form memories begins to decrease. Research has shown that an increase in the production of a certain molecule, BDNF, seems to restore the processes involved in storing memories. BDNF is found in the central nervous system and seems to be important in maintaining nerve cell health. Researchers are testing a new drug that seems to increase the production of BDNF.

20) Design an experiment to test the effectiveness of the new drug to increase the production of BDNF in the brains of rats. In your answer, be sure to:

- state the hypothesis your experiment will test [1]
- describe how the control group will be treated differently from the experimental group [1]
- identify *two* factors that must be kept the same in both the experimental and control groups [1]
- identify the dependent variable in your experiment [1]